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The Polyporaceae of North America — X. Agaricus, Lenzites, Cerrena, and Favolus

WILLIAM ALPHONSO MURRILL

Plants with variable daedaleoid or lamelloid hymenium and light-colored context and spores form the subject of the present article. These plants, like those of the genus *Sesia* discussed in article IX, recognize none of the ordinary specific or even generic limitations of the group and must be treated in a class by themselves. If they were amenable to ordinary methods of cultivation, they would surpass *Oenothera* in supplying most excellent examples of mutation.

Through the genus *Favolus*, taken up at the close of this paper, we return to the normal poroid forms of the family.

AGARICUS (Dill.) L. Sp. Pl. 1176. 1753

Striglia Adans. Fam. Pl. 2: 10. 1763.
Daedalea Pers. Syn. Fung. 499. 1801.
Daedaleopsis Schroet. Krypt. Fl. Schles. 3: 492. 1888.

The type of the genus *Agaricus* is *Agaricus quercinus* L. This is the only species common to Linnaeus and Dillenius, the author of the genus. Primarily, the name *Agaricus* was applied to dimidiate woody forms and the application of the present code* restores it to one division of this group. It is unfortunate that the association of fleshy and woody forms by Linnaeus under the name *Agaricus* has entirely diverted it from its earlier use and made necessary a number of changes in its restoration. Such changes could be avoided in only one way, *i. e.*, by applying canon 15 (f) of the code, which allows a well-known economic species to be selected as the type in order to avoid change in the current application of a Linnaean generic name. *Agaricus campestris* is such a species and *might* be adopted as the type of the genus *Agaricus*. I hesitate, however, to make use of a provision designed especially for *Poa pratensis*. I fear also that this provision, being the only one of its kind in the code, is in danger of being overworked. Moreover, I have good reason to know that a mere makeshift of this kind will never be accepted by working mycologists as permanent. *Agaricus*, then, properly figures as a genus of the *Polyporaceae.*

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* Bull. Torrey Club, 31 : 249–261. 1904.

The genus *Striglia* was founded by Adanson upon Batarra's *plate 38*, which represents several common species of *Agaricus*, the first being *A. quercinus* L.

Daedalea of Persoon was founded on *D. quercina* (L.) and four other species, one of them being *D. confragosa.* Batarra is quoted at some length and *plate 38* cited by Persoon, but no mention is made of *Striglia*, based on the same plate.

Daedaleopsis, founded upon the single species *Daedalea confragosa* (Bolt.), completes the list of synonyms.

Species belonging to the genus *Agaricus* have white or wood-colored context, hyaline spores and poroid, daedaleoid or lamelloid tubes. One rare species, *A. juniperinus*, occurs on coniferous wood; all the others are found abundantly on decaying wood of various deciduous trees. One species, *A. deplanatus*, is tropical; the rest occur in the United States and Canada, and two of these are found also in Europe. Most of the species, in spite of the remarkable variability of some of them, are easily distinguished; *A. Aesculi* and *A. deplauatus*, however, approach very near each other in some of their forms.

Synopsis of the North American species

1. Tubes one to several millimeters in transverse diameter; surface usually brown or discolored; plants found in temperate regions. 2.
   Tubes less than one-half millimeter in transverse diameter; surface white or yellowish; plants found in the southern states or the tropics. 3.

2. Pileus thick, triangular, margin obtuse; tubes large, daedaleoid, dissepiments obtuse; context wood-colored; plants abundant on oak. 1. *A. quercinus.*
   Pileus thick, triangular, margin obtuse; tubes large, daedaleoid, dissepiments obtuse; context white; plants rare on red cedar. 2. *A. juniperinus.*
   Pileus thin, applanate, multizonate, margin very acute; hymenium poroid, daedaleoid or lamelloid, dissepiments acute. 3. *A. confragosus.*

3. Pileus reniform, rigid, usually azonate; plants found in the southern states. 4. *A. Aesculi.*
   Pileus thin, flexible, variously shaped, usually multizonate; plants confined to the tropics. 5. *A. deplanatus.*

1. AGARICUS QUERCINUS L.

Agaricus quercinus L. Sp. Pl. 1176. 1753.—Sow. Engl. Fung. *pl. 181.*

Agaricus labyrinthiformis Bull. Herb. Fr. *pl. 352.* 1787.

Daedalea quercina Pers. Syn. 500. 1801.

Polyporus latissimus Fr. Obs. **1**: 128. 1815.

Daedalea quercina var. *nigricans* Fr. Syst. **1**: 333. 1821.

This very common species has been known from ancient times on account of its size and abundance and because it grows on stumps and timbers in conspicuous places. The abundant use of oak, its favorite host, brings it to the attention of many. Bauhin and other prelinnaean botanists seem to have been impressed with the striking appearance of its hymenium, expressed by Linnaeus in his " Agaricus acaulis, lamellis labyrinthiformibus " and by Bulliard in his choice of a specific name. The figure on Batarra's plate 38 is a rather old blackened form of this species, distinguished by him as a variety and cited by Fries as var. *nigricans.* *Polyporus latissimus* was described by Fries from resupinate forms frequent on structural oak timbers before he was well acquainted with the variations of the species. As this species is so extremely common and well-known, it is not considered necessary to give a list of available collections. All the exsiccati contain specimens of it, and one can hardly fail to find it at any season of the year on some oak stump or decaying trunk.

2. **Agaricus juniperinus** sp. nov.

Sporophore corky, sessile, attached by a broad, often decurrent, base, composed of imbricate, terraced or laterally connate, ungulate pilei 2–5 × 2–7 × 1.5–3 cm.; surface irregular, anoderm, finely tomentose, yellowish-white, becoming cinereous with age; marginal edge fertile, concolorous, not rounded, but often forming an obtuse angle: context corky, white, concentrically banded, 0.5–1 cm. thick; furrows large, labyrinthiform, radially, rarely otherwise, elongated, 0.5–2 cm. long, 1–3 mm. wide, white or pallid, edges obtuse, often splitting into broad irpiciform plates: spores smooth, hyaline, ovoid, 3–4 × 5–6 μ.

The type plants of this species were collected by Bartholomew on a red cedar stump near Rockport, Kansas, November 8, 1894. It was again collected by Bartholomew on the same host but in a different locality in 1896, and Demetrio found it in Cole County, Missouri, September, 1898, growing in a decayed spot on a living red cedar trunk.

The nearest American congener of this species is probably *A. quercinus*, from which it may be easily distinguished by its milk-white context. It is also known only on red cedar, while *A. quercinus* occurs on the wood of deciduous trees.

3. **Agaricus confragosus** (Bolt.)

Boletus confragosus Bolt. Halifax Fung. Suppl. **3**: 160. *pl. 160.* 1791.
Daedalea confragosa Pers. Syn. 501. 1801.
Daedalea rubescens Alb. & Schw. Consp. Fung. 238. *pl. 11. f. 2.* 1805.
Daedalea albida Schw. Syn. Car. 67. 1818. Fr. Not *D. albida.*
Daedalea zonata Schw. Syn. Car. 68. 1818.
Daedalea discolor Fr. Elench. Fung. 68. 1828.
Daedalea discolor Kl. Linnaea **8**: 481. 1833.
Daedalea corrugata Kl. Linnaea **8**: 481. 1833.
Trametes rubescens Fr. Epicr. 492. 1836.
Lenzites Klotzschii Berk. Ann. Mag. Nat. Hist. **7**: 452. 1841.
Lenzites Crataegi Berk. Lond. Jour. Bot. **6**: 323. 1847.
Lenzites unguliformis B. & C. Hook. Jour. Bot. **1**: 101. 1849.
Lenzites bicolor Fr. Nov. Symb. 43. 1851.
Lenzites Cookeii Berk. Grevillea **4**: 161. 1876.
Lenzites proxima Berk. Grevillea **4**: 162. 1876.

This remarkable species has a literary history in keeping with its wonderful variation in nature. Bolton appears to have the credit of noticing it first, and, fortunately, his description and figures are excellent. He speaks of it as growing on stumps and the dead roots of trees at Fixby-Hall, the type locality, and other places in Halifax. His description is here given:

"Boletus coriaceo lignosus sessilis dimidiatis, supra scabroso zonatus subfuscus, carne ferrugineo-pallide, tubis cinereis poris multiformis."

Persoon made use of Bolton's name, but does not seem to be clear as to the identity of the plant in question. Albertini and Schweinitz described it under the name of *D. rubescens*, at the same time questioning whether it might not be the same as *D. angustata* (Sow.) Fr. Schweinitz again described the thin forms met with in Carolina under different names, which were much discussed by European mycologists.

Fries changes one of Schweinitz's specific names to *D. discolor* in his Elenchus, because it was preoccupied by one of his own. Type plants of this species grew on birch trunks. A little later, Klotsch finds a specimen in Hooker's herbarium collected by Dr. Richardson on a birch trunk in boreal North America, which he determines as *D. discolor* Fr., but Fries disclaims it and calls it *D. discolor* "Kl. *nec* Fr." Then Berkeley throws the species into *Lenzites* and names it after Klotsch. This is only the beginning of Berkeley's career in connection with *D. confragosa*, for we find him between this time and 1876 assigning four new names to different specimens of this species, *L. Crataegi* to plants collected in Ohio by Lea, *L. unguliformis* to specimens sent from North Carolina by Curtis, *L. Cookeïi* to Peck's specimens collected on willow and birch in New York and *L. proxima* to New York plants collected by Sartwell. *L. Lyallii* Berk. from Vancouver also seems to be a form of this species, but the type plants are in such poor condition that it is impossible to determine this with certainty.

A form found in Mexico by Schiede and recently duplicated by Smith appears to have as much claim to distinction as any yet reported, if it were only possible to separate it from thin lenzitoid forms found in the Southeastern states. In describing this form in 1851, as *L. bicolor*, Fries says that he had received the same thing from Curtis in South Carolina under the name of *D. tricolor*. A full discussion of this and several other varieties, by Peck, may be found in the 30th Report of the N. Y. State Museum of Natural History; on page 73 the author summarizes the forms discussed which have received specific names as follows:

"*Daedalea confragosa* Pers. which is represented by forms of our plant having a scabrous somewhat zoned pileus of a reddish-brown color and a daedaleoid hymenium."

"*Trametes rubescens* A. & S. which is represented by forms that assume the ruddy color and have the trametoid hymenium."

"*Lenzites Crataegi* Berk. which is represented by forms having a shining pileus attached by the vertex and having a trameto-lenzitoid hymenium."

"*Lenzites Cookei* Berk. which is represented by forms with the pileus of a cervine hue and with a trameto-lenzitoid hymenium."

"*Lenzites proxima* Berk. with the thin flattened pileus completely overspread by the peculiar tomentum previously described."

Peck considers all these varieties of one protean species and suggests that the specific names under which they were described be retained as varietal names.

After the study of a quantity of material, including most of the original type collections, and numerous observations of various stages of this plant in the field, I am forced to confess that in spite of its wonderful variation in size as well as in general appearance, I find it impossible to make more than one species of it. When the ordinary form common in New York is compared with specimens from the Carolinas only 1 cm. in diameter and they in turn with large, thick poroid forms from Florida or very thin, expansive lenzitoid forms from Mexico, one at once concludes that he is dealing with different plants; but let a large array of specimens from different localities be examined and all the specific distinctions seem to disappear in well-graded intermediate forms which are with difficulty set aside. It is not strange that the foreign mycologists who had only isolated specimens to deal with should have erected so many species.

In examining European forms, some are easily recognizable as distinct from those seen in America, but, knowing this plant as we do at home, who shall attempt to separate any of them specifically!

This species is met with abundantly about New York growing on dead trunks or branches of sweet gum, willow, birch, oak, dogwood, alder, beech and other deciduous trees and shrubs. The tubes are usually daedaleoid, sometimes porous, when young, very pale flesh-colored, turning at once to yellowish-brown when bruised. The surface is light to dark yellowish-brown and the margin, which is lighter, shows fan-like radiations of growth. Zones may or may not be present. As the fruit becomes older, the tubes very often become lenzitoid and various changes take place in the appearance of the surface. The spores are hyaline, cylindrical, $9 \times 2\ \mu$.

The following collections will indicate the wide range of the species in North America: Rav. Fung. Car. Fasc. 2. nos. *15* and

416; Ell. & Ev. N. A. Fung. *1924*, *1925*, *1926*, *1927*, *1928*; Underw. & Cook, Illus. Fung. *18*; Shear, N. Y. Fung. *40*; Canada, *Macoun*, *Dearness*; Maine, *Blake*, *Miss White*; Connecticut, *Seymour*, *Earle*, *Miss White*, *Underwood*; New York, *Barbour*, *Peck*, *Mrs. Britton*, *Underwood*, *Earle*, *Murrill*; New Jersey, *Martindale*, *Earle*, *Anderson*, *Murrill*; Delaware, *Commons*; Pennsylvania, *Stevenson*, *Sumstine*, *Gentry*; Maryland, *Miss Banning*, *Shear*, *Ricker*; Virginia, *Murrill*; North Carolina, *Memminger*; Georgia, *Harper 2037a*, *20422*; Alabama, *Earle*, *Baker*; Louisiana, *Langlois*; Florida, *Calkins*; Ohio, *Morgan*; Tennessee, *Murrill 594*, *607*; Kansas, *Bartholomew*; Wisconsin, *Baker*; Texas, *Hodson*.

4. **Agaricus Aesculi** (Schw.)

Boletus Aesculi flavae Schw. Syn. Fung. Car. 70. 1818.
Polyporus Aesculi Fr. Elench. 99. 1818.
Trametes incana Berk. Lond. Jour. Bot. **4**: 305. 1845. Not *T. incana* Lév.
Daedalea ambigua Berk. Lond. Jour. Bot. **4**: 305. 1845.
Trametes ambigua Fr. Nov. Symb. 96. 1851.
Trametes lactea Fr. Nov. Symb. 96. 1851.
Lenzites glaberrima B. & C. Grevillea **1**: 34. 1872.
Daedalea glaberrima B. & C. Grevillea **1**: 67. 1872.
Trametes Berkeleyi Cooke in Sacc. Syll. Fung. **9**: 194. 1891.

The first description recorded of this species is that made by Schweinitz in his Synopsis under the name of *Boletus Aesculi flavae*, which is as follows:

"B. minor subimbricatus, pileo dimidiato duriusculo fornicato glabriusculo pallido margine sterili, poris minutis sulphureis."

"In arboribus, imprimis *Aesculi flavae* Wilkes County, ad ripam Yadhin. Caespites duas tresve uncias longi. Parum imbricatus, fere simplex. Pileus suberosus, subtenuis, basi crassior, glaber, tactu subtomentosus. Pori demum nigrescunt."

This is not a good description of the plant. Several statements in it are misleading as well as incomplete. It is possible that Schweinitz confused this species with one ordinarily known as *P. hemileucus*, rather common in the Carolinas. This supposition would account for Fries' remark with reference to the specimen sent him by Schweinitz that it was "*rubiginosus*." However, the plant in the Schweinitz herbarium is undoubtedly *Daedalea ambigua* and not *P. hemileucus*, which settles the question of type.

Trametes incana Berk. was founded on specimens collected by Lea on dead trunks of trees in Ohio. These specimens were possessed of a very short lateral, disciform stem, a yellowish hymenium and roundish, or rarely linear and sinuous, pores. The name was changed to *Trametes Berkeleyi* in 1891 by Cooke because of *Polyporus* (*Trametes*) *incana* Lév. (Bonite, Crypt. 183. 1844–1846), described from the Philippines. Although *Trametes* seems to be used here as a subgenus, the author writes it as a genus lower down on the same page when he comes to refer to and describe the figures: "*Pl. 137. f. 2. Trametes incana* de grandeur naturelle," etc.

Daedalea ambigua was described by Berkeley in almost the same breath with the previous species and the specimens were collected in the same locality by Lea. Montagne considered the two species the same, but Berkeley, influenced to a considerable extent by Lea, finally decided to make them distinct because of the narrow, sinuous pores of the latter.

Trametes lactea was described from plants sent to Fries from Carolina by Curtis. These plants were evidently porous forms of this species and naturally fell under the genus *Trametes* so far as Fries could determine from the material.

Lenzites glaberrima was also described from Carolina material sent by Curtis. This time the tubes were lenzitoid and anastomosing and there was an orbicular disc for the base.

Daedalea glaberrima was meant by Berkeley for an entirely distinct species. The pores are described as "at length sinuous" and the stem as "lateral, one-half an inch long and wide." The type specimens were sent from South Carolina by Curtis.

In addition to the above, several other names have been used quite freely by collectors and systematists in connection with this species. *Trametes marchionica*, for example, described from the Marquesas Islands by Montagne (Voy. Pole Sud, 204. 1845), is often treated as a synonym of *D. ambigua*. *Trametes Mülleri* Berk. is applied to Cuban forms of *D. ambigua* at Kew and elsewhere, although the type locality of the species is the Victoria

River, Australia. There is ample excuse for this, however, in the fact that this species is described in a work on Cuban fungi and is undoubtedly considered by the author to exist in Cuba; nevertheless, since no definite statement to this effect nor the citation of a collector's number accompanies the description, the type locality as given and also as implied in the personal specific name must be considered the correct one for the species. There exists a very close relationship between the various forms of *D. ambigua* and species described from regions of the Orient, but a discussion of this relationship is beyond the scope of the present article.

As one may judge from the above discussion, *Agaricus Aesculi* is a variable species and liable to confuse the collector who relies too much upon regularity of pore-structure. If one considers the variability of the genus, however, he will have little trouble in distinguishing it by color, surface and size. It is found on stumps, trunks, and other forms of decaying wood of oak, sycamore, etc., in the Southern states. Specimens are at hand from Missouri, *Demetrio;* Kansas, *Bartholomew;* Ohio, *Morgan*, *Lloyd;* South Carolina, *Ravenel;* Florida, *Martin*, *Rau*, *Calkins*, *Lloyd;* Texas, *Hodson 320.*

5. **Agaricus deplanatus** (Fr.)

Daedalea elegans Spreng. Vet. Acad. Handl. 51. 1820. — Fr. Syst. **1**: 335. 1821; Elench. 69. 1828. Not *Agaricus elegans* Scop. Fl. Carn. ed. 2. **2**: 438. 1772.

Daedalea deplanata Fr. Linnaea **5**: 513. 1830.

Lenzites deplanata Fr. Epicr. 404. 1838.

Trametes elegans Fr. Epicr. 492. 1838.

Trametes centralis Fr. Nov. Symb. 95. 1851.

The name *Daedalea elegans* was first assigned to plants found on tree trunks in Guadeloupe. Sprengel's original description is as follows:

"D. coriaceo-lignosa sessilis, pileo supra albido glaberrimo, subtus alutaceo, lamellis anastomosantibus in poros marginales abeuntibus."

This was enlarged by Fries after the study of a considerable variety of forms. Ten years later Fries himself described another form of the same species collected by Beyrich in Brazil under the name of *Daedalea deplanata.* His *Trametes centralis*, also a synonym, is based upon collections made in the West Indies, Costa Rica and Mexico, in which the sporophores are sessile at the center, with pores decurrent to the base.

Other species, either synonymous or closely related to those above described, but purposely kept separate at this time from North American forms are as follows:

Daedalea amanitoides Palis. de Beauv. Fl. Owar. **1**: 44. *pl. 25.* 1804. *Daedalea Palisoti* Fr. Syst. **1**: 335. 1821. *Lenzites Palisoti* Fr. Epicr. 404. 1838. Afzel. Fung. Guin. **1**: *pl. 11. f. 23. a, b.* The species was described from Oware, growing on trunks. I know of no reason for changing the specific name to *Palisoti.*

Daedalea repanda Pers. Freyc. Voy. 168. 1826. Mont. Cuba 382. *pl. 14. f. 4.* 1842. *Lenzites repanda* Fr. Epicr. 404. 1838. (Not *Agaricus repandus* Bull.) Described from the island of Rawak as "D. latissima albido-pallens, pileo glabro zonato margine repando, sinulis angustis densis, margine subdentatis." Montagne adopts the name for Cuban specimens and cites *D. polita, D. deplanata, D. laevis, D. applanata, D. Palisoti* and *D. indica* as synonyms. He appears to have given considerable attention to the various forms in Cuba with reference to growth and variation.

Daedalea polita Fr. Linnaea **5**: 514. 1830. *Lenzites polita* Fr. Epicr. 404. 1838. Described from specimens in the herbarium of Willdenow collected by Bory on Bourbon, or Reunion, Island. The type in Fries' herbarium has the exact contour of *A. Aesculi,* but is thinner. The surface is like that of *A. Aesculi,* but the pores are more like those of *A. deplanatus.*

Daedalea applanata Kl. Linnaea **8**: 481. 1833. *Lenzites applanta* Fr. Epicr. 404. 1838. Collected on trunks in the island of Mauritius by Telfair and described from the herbarium of Hooker. The author questions if it is not *D. deplanata* Fr. or *D. polita* Fr.

Polyporus (*Trametes*) *lactineus* Berk. Ann. Mag. Nat. Hist. **10**: Suppl. 373. 1843. Described from specimens collected by Koenig in Ceylon and named by him in herbarium "*Boletus lacteus.*" Berkeley does not distinguish it from forms found in the West Indies.

Lenzites platypoda Lév. Bonite, Crypt. 184. 1844–1846. This appears to be in no way specifically distinct from *Daedalea repanda*

Pers., but the author, who was at that time but little acquainted with oriental forms, thinks that the stipe and pores sufficiently distinguish it from Persoon's species.

This exceedingly variable and very attractive species is abundant on decaying wood in tropical America. In some localities the young sporophores, although tough, are used as food by the natives. It differs from *A. Aesculi* in being thin and flexible and usually much more zonate, though at times the two species are not easily distinguished. One is here forcibly reminded of *Pycnoporus cinnabarinus* and *Pycnoporus sanguineus*, which exhibit much the same relations, indicating that the effect of tropical conditions may be to produce a thinner, more expanded and more zonate sporophore.

Specimens are at hand from Florida, *C. G. Lloyd;* Bahamas, *Mrs. Britton 773, 847;* Porto Rico, *Wilson 294;* Hayti, *Nash 234, 240;* Cuba, *Underwood & Earle 1522, Hamilton;* Mexico, *Egeling;* Nicaragua, *Smith;* British Guiana, *Millspaugh 13529;* Honduras, *Wilson 411;* Yucatan, *Millspaugh 57800;* Colombia, *Baker.*

SPECIES INQUIRENDAE

Daedalea subtomentosa Schw. Syn. Fung. Car. 68. 1818. Described from North Carolina material as follows:

"D. minor gibbosa, zonis elevatis subtomentosis albida, sinubus poriformibus angustis albis et pallidis. Passim. Species non valde distincta. Pileus glaber tuberculosus."

This is very probably another synonym of *A. confragosus*, but I have not been able to find type material. Even Schweinitz himself says that it is not a very distinct species.

Irpex maximus Mont. Ann. Sci. Nat. II. Bot. **8**: 364. 1837. Syll. Crypt. 174. 1856. *Polyporus labyrinthicus* Mont. Cuba, 406. 1842 (not *P. labyrinthicus* Fr. Elench. 83. 1828).

This species was described from material collected by Ramon de la Sagra on the trunks of trees in Cuba. Montagne's earlier description is as follows:

"Pileo coriaceo tenui reniformi plano-convexo velutino marginem versus repandum acutum concentrice sulcato demum basi glabrescenti subradiato dentibusque confertis acutis pubescentibus ochroleucis."

"Pileus 8 poll. transversim latus, 6 poll. longus, vix lineam semis cum dentibus crassus, subtus vel ad marginem prolifer. Eximie distincta species nec cum ulla alia confundenda."

Before the appearance of his work on Cuban cryptogams, Montagne seems to have changed his mind regarding the distinctness of this species and in that work adopts Fries' name and description for his plant.

Lenzites tenuis Lév. Ann. Sci. Nat. III. Bot. 5: 122. 1846. Collected on trunks in Guadeloupe and thus described:

"Pileo subflabellato coriaceo azono nudo pallide ochroleuco postice fuscescente margine acutissimo lobato quandoque prolifero, lamellis rectis dichotomis anastomosantibus acie acutis concoloribus."

"Cette espèce est voisine du *Lenzites polita*, dont elle diffère par le peu d'épaisseur du chapeau et la ténuité des lames; la marge, qui est très mince, donne quelquefois naissance à d'autres petits chapeaux. Il atteint de 8 à 10 centimètres dans son plus grand diamètre."

This species resembles thin forms of *Agaricus confragosus*, but more material is needed to determine its exact relations.

Daedalea violacea Lév. Ann. Sci. Nat. III. Bot. 5: 142. 1846. Described from specimens collected on trunks in Cuba as follows:

"Pileo coriaceo applanato semi-orbiculari nudo inaequabili zonato lurido e basi ad marginem patentem acutum lobulatum fibroso-radiato, sinubus minutissimis anastomosantibus violaceis."

"Chapeau coriace, large de 12 à 14 centimètres, épais de 5 millimètres, à surface zonée, nue, inégale, marquée de stries qui naissent de la base et s'étendent à la marge. Cette espèce de *Daedalea* rappelle par la ténuité des sinus ceux de l'*Hymenogramme javensis*, et présente sur les deux faces une couleur violette semblable à celle du *Polyporus Auberianus*. On ne peut cepandant confondre ce *Daedalea*, quoique du même pays, avec ce dernier, dont les pores sont ronds."

Daedalea plumbea Lév. Ann. Sci. Nat. III. Bot. 5: 302. 1846. Described from plants collected on trunks in New York as follows:

"Pileo sessili reniformi vel semi-orbiculari coriaceo depresso zonato inaequabili nudo plumbeo, sinubus lamellosis labyrinthiformibus laxis obtusis fuscis, contextu concolori."

"Chapeau coriace, semi-orbiculaire ou réniforme, large quelquefois de 2 décimètres: sa marge tend constamment à se relever. La surface est nue, tuberculeuse,d'un gris plombé; les sinus sont àpeu près semblables à ceux du *Daedalea quercina*, mais d'une couleur obscure, ainsi que le parenchyme du chapeau."

The above description indicates that the author was possibly dealing with old and darkened specimens of *Agaricus quercinus.*

Daedalea puberula B. & C. Grevillea **1**: 67. 1872. Described from plants collected in Pennsylvania by Michener as follows:

"Pileo molli-suberoso, irregulari, dimidiato, hic illic tuberculoso, puberulo, ochraceo; margine tenui: poris parvis demum sinuatis."

"About 4 inches across; irregular, corky, of a soft substance, which is slightly zoned, attached behind, and more or less decurrent, even, with the exception of a few obtuse, tubercular, elevations, finely pubescent; ochraceous; pores about 1/50 inch across, sinuated; of the same colour as the pileus."

LENZITES Fr. Gen. Hymen. 10. 1836

This genus, dedicated to Lenz, was described by Fries as follows:

"Lamellae coriaceae, radiantes, nunc simplices, nunc poroso-anastomosantes, acie compaginatae; dissepimento pileo floccoso."

Fries lists only three species, *L. betulina*, *L. abietina* and *L. heteromorpha*, the first of which we consider the type. As at present limited, the genus contains only two North American species, one very abundant in the United States and Canada and the other known only from Cuba.

Synopsis of the North American species

Surface of the pileus conspicuously tomentose.	1. *L. betulina.*
Surface of the pileus finely pubescent.	2. *L. cubensis.*

1. LENZITES BETULINA (L.) Fr.

Agaricus betulinus L. Sp. Pl. 1176. 1753.—Sowerby, Eng. Fung. *pl. 182.* 1799.

Daedalea betulina Rebentisch, Prodr. Fl. Neom. 371. 1804.—Fr. Obs. **1**: 104. 1815.

Lenzites betulina Fr. Gen. Hymen. 10. 1836.

Linnaeus describes this species as "Agaricus acaulis coriaceus villosus: margine obtuso, lamellis ramosis anastomosantibus." "Fl. Suec. 1085. Habitat in Betulis." Later botanists also described it under various other names. The plant is exceedingly common and is so well known as to need no description, being found in abundance on old stumps, fallen branches and other forms of deciduous wood throughout the north temperate zone. Fries says in his Epicrisis that it is confined to deciduous wood, but Peck states that it occurs also on that of evergreen trees. I have never seen it growing upon coniferous wood, but many of our fungi that normally occur upon deciduous wood have been known to attack that of dead conifers in the vicinity, or, in barren regions, when hard pressed for food.

The following specimens are listed in order to give some idea of the range of this species: Finland, *Karsten;* Germany, *Sydow;* Massachusetts, *Porter;* New York, *Britton, Murrill;* New Jersey, *Ellis, Mrs. Lobenstine;* Pennsylvania, *Barbour;* Virginia, *Murrill;* Tennessee, *Murrill 636;* South Carolina, *Ravenel;* Alabama, *Earle & Baker;* Missouri, *Demetrio;* Kansas, *Bartholomew;* Michigan, *Hicks;* Wisconsin, *Baker;* Montana, *Mrs. Fitch.* Many other collections and most of the published exsiccati contain good examples of this fungus.

2. LENZITES CUBENSIS B. & C.

Lenzites cubensis B. & C. Jour. Linn. Soc. Bot. **10** : 303. 1868.

Described from plants collected by Wright in Cuba on dead wood as follows:

"Pileo duro ligneo dimidiato subvelutino cervino zonato rugoso; stipite nullo vel brevissimo; lamellis repetite furcatis crenatis vel crispis concoloribus latioribus."

"Pileus 2½ inches broad and 1½ inches long."

Nothing is known of this species beyond the above description and a few type specimens still to be seen at Kew and Paris. It appears, however, to belong with our common species, *L. betulina*, from which it may at once be distinguished by its almost glabrous surface. It is no doubt rare and possibly confined to the higher altitudes of Cuba.

SPECIES INQUIRENDAE

Lenzites Berkeleyi Lév. Ann. Sci. Nat. III. Bot. **5**: 122. 1846. Based upon plants collected by Ménand in New York. *Daedalea betulina velutina* Berk. (Ann. Mag. Nat. Hist. **3**: 381. 1839) is cited as a synonym and doubtless accounts for the specific name adopted. Berkeley's description is as follows:

"Pileus hard, sessile, dimidiate, lobed, deeply zoned, tawny, velvety. Gills rather thick."

"New Orleans and other parts of North America. Hooker Herbarium. The pileus is by no means tomentose, but clothed with very short close velvety pubescence. Vertex sometimes lengthened out into a sort of stem. *Thelephora lobata* varies in the same way."

Léveillé's description of the species is as follows:

"Pileo coriaceo flexili subreniformi sessili hirsuto fulvo zonis confertis prominentibus notato, lamellis latissimis distantibus acie integris ochroleucis."

"Chapeau presque réniforme, coriace, large de 4 à 8 centimètres, d'une belle couleur fauve, avec des zones saillantes et assez rapprochées; les lames sont très larges, comparées à l'épaisseur du chapeau, jaunes, à marge tranchante et entière."

In their Commentary on Schweinitz' Synopsis, Berkeley and Curtis determine no. 486, "*D. an gibbosa*, ?" as *Lenzites Berkeleyi* Lév.

CERRENA S. F. Gray, Nat. Arr. Brit. Pl. **1**: 649. 1821

This genus was founded upon *Cerrena cinerea* (Pers.), a single species. The very brief generic description, "Stem distinct: cap semicircular," is followed by the citation of two synonyms and a short description of the species. Although the descriptions are unsatisfactory, the citations point very plainly to a definite and well-known species as the type of the genus.

CERRENA UNICOLOR (Bull.) Murrill

Boletus unicolor Bull. Herb. France, *pl. 408.* 1788. *pl. 501.* 1791.—Bolt. Hist. Fung. Halifax, Append. 163. *pl. 163.* 1791.—Sowerby, Eng. Fung. *pl. 325.* 1801.
Boletus decipiens Schrad. Spic. 169. 1794.
Sistotrema cinereum Pers. Syn. 551. 1801.
Daedalea unicolor Fr. Syst. **1**: 336. 1821.
Phyllodontia Magnusii Karst. Hedw. **22**: 163. 1883.
Cerrena unicolor Murrill, Jour. Myc. **9**: 91. 1903.

This species was first described from France by Bulliard. The ordinary form has been known for a long time, but European mycologists were considerably puzzled in 1876 by the discovery of a peculiar hydnoid form on a birch stick in the fern house at

Berlin. Specimens were sent to various mycologists and one of them was described by Karsten as *Phyllodontia Magnusii*, in honor of the discoverer, and became the type of a new genus. Hennings later found specimens of the same form in the same place, and traced their connection with *Daedalea unicolor*.

Cerrena unicolor is extremely abundant on stumps, logs and various other forms of decaying deciduous wood in the north temperate zone. New pilei form early in the season from the old ones, the surface being at first light yellowish-white and very hairy, becoming gray with age. The tubes are porous in very young stages, but soon unite into complicated labyrinthiform channels and later split up into teeth resembling those found in the *Hydnaceae*. No choice beyond deciduous wood is apparent as regards host; oak, beech, poplar, walnut, hickory, birch, elm, apple and various other broad-leaved trees serving as food when dead or decayed.

Specimens have been examined in all the published exsiccati that pretend to exhibit northern plants of this group. From the following list a good idea may be gained of the wide range of the species: Russia, *Jaczewski;* Sweden, *Romell;* Germany, *Magnus;* Austria, *Bresadola;* France, *Patouillard;* Newfoundland, *Waghorne;* Maine, *Ellis*; New Hampshire, *Gerard, Blake, Jeffries;* Massachusetts, *Miss Minns;* New York, *Shear, Ellis, Underwood, Earle, Peck, Murrill;* New Jersey, *Ellis, Underwovd, Earle, Murrill;* Pennsylvania, *Herbst, Stevenson, Small, Banker;* Delaware, *Commons;* West Virginia, *Nuttall;* Virginia, *Murrill 252;* Ohio, *Morgan, Lloyd;* Illinois, *Mrs. Roy;* Missouri, *Demetrio;* Kansas, *Cragin;* Michigan, *Pieters, Wood;* Iowa, *Holway.*

SPECIES INQUIRENDAE

Daedalea tortuosa Cragin, Bull. Washburn Lab. Nat. Hist. **1**: 26. 1884. Jour. Myc. **1**: 28. 1885. Described from specimens collected on rotten logs at Topeka, Kansas, as follows: "Pilei dimidiate, convex, often imbricated and confluent, between corky and woody, strigose-roughened, pale yellowish-brown, becoming smoother and paler, internally concolorous, zonate, one-twelfth to one-eighth of an inch thick, usually once or twice sulcate near the acute, minutely repand, ferruginous-brown margin.

(Margin sometimes concolorous.) Hymenium pale cinnamon-brown, generally effused at the base and abruptly sub-porous at the margin. Sinuses labyrinthiform, flexuose, intricate, torn and toothed; very similar to those of *D. unicolor* Fr., except in color and much larger size. The largest single pilei observed measure about two inches in length by three in breadth."

Authentic specimens of this plant have not been seen, but there appears to be little in the description to distinguish it from forms of *Cerrena unicolor*.

FAVOLUS Beauv. Fl. Owar. **1**: 1. *pl. 1.* 1805.

This genus was founded upon a single species, *F. hirtus* Beauv., which, although commonly known under the name of *Hexagona hirta*, recalls the true honeycomb-like structure of the hymenium which was originally the distinguishing feature of the genus *Favolus*. The genera *Hexagona* and *Favolus*, both monotypic in origin, were interchanged by Fries because the species were unfamiliar to him and they have been incorrectly used ever since.

In the *Systema*, Fries followed Beauvois and included *Hexagona* under the subgenus *Favolus* of *Polyporus*. In the *Epicrisis*, Fries includes *F. hirtus*, Beauvois' type, in the genus *Hexagona* and follows it with *H. Mori*, Pollini's type. He then begins his genus *Favolus* with *F. europaeus*, a synonym of *H. Mori*.

The plants of this genus are not well known, few as they are. The two species ordinarily collected in North America are confined to the tropics, a comparatively unworked region. There is little difference either in the abundance or the distribution of these species, but they may be easily distinguished by color and markings. Both species vary rather remarkably in the size of their pores. Berkeley frequently commented upon it in his writings and his varieties testify to the fact. There appears to be absolutely no other different character accompanying this difference in pore measurement. A large collection of specimens is needed in order to guess at the cause of this variation, which at times amounts to two or three diameters.

Synopsis of the North American species

Surface marked with white and light-brown zones.	1. *F. tenuis.*
Surface variegated with dark-brown and purple zones.	2. *F. variegata.*

1. **Favolus tenuis** (Hook.)

Boletus reticulatus Hook. in Kunth, Synopsis **1**: (9). 1822. Not *B. reticulatus* Schaeff.

Boletus tenuis Hook. in Kunth, Synopsis **1**: (10). 1822.

Polyporus polygrammus Mont. Ann. Sci. Nat. II. Bot. **8**: 365. 1837.

Hexagona tenuis Fr. Epicr. 498. 1838.

Hexagona polygramma Fr. Epicr. 497. 1838. — Mont. Pl. Cell. Cuba 379. *pl. 14. f. 3.* 1842.

Hexagona favoloides Peck, Bull. Torrey Club **10**: 73. 1883.

This species is found in the Linnaean herbarium marked *Boletus favus*, but not by Linnaeus nor with his sanction. It was first described by Hooker from plants collected in the Andes between Popayan and Almaguer by Humboldt, under the name of *Boletus reticulatus*. Following this species on the next page is *Boletus tenuis*, described as differing from the preceding in its paler, smooth, dimidiate pileus and empty pores. According to Klotzsch, *Boletus reticulatus* is only a monstrous form of *Boletus tenuis* with the pores spongy-stuffed and the pileus orbicular, fixed at the center and more than usually reticulate-rugose on the surface. This view is strengthened by the fact, which Hooker states, that the two species were found growing together.

In reviewing Klotzsch's work in 1839, Berkeley lists *Boletus reticulatus* as synonymous with *Boletus tenuis* and enlarges Hooker's description from the original specimens, explaining that the monstrous form in question was caused by the accidental reversal of the log or branch upon which it grew and that the spongy-stuffed pores were due to the beginning of a new pileus, while the abnormal reticulations on the surface were caused by a new hymenium beginning to form on the old pileus. This leaves practically no doubt as to the identity of the two species; but since the first name is antedated by one of Schaeffer's, *Boletus tenuis* would hold for our plants in spite of the doubt.

The Cuban plant, finely described and figured by Montagne, appears in the figure to have larger pores than plants from elsewhere, but the type collections do not indicate that it is specifically different.

Peck's species, described from plants collected by J. J. Brown on the Roatan Islands off the coast of Honduras, is well represented by a number of specimens collected recently in Honduras by Wilson, and I do not find it distinct in its mature stages from Hooker's plant. The fresh young sporophores have a strong resemblance, as Peck says, to forms of *Agaricus confragosus*.

This species is fairly common and, in some localities, rather abundant in tropical America. Among the plants examined the following may be mentioned: Guayaquil, *Lagerheim;* Colombia, *Baker;* Nicaragua, *C. L. Smith, Shimek;* Honduras, *Wilson 4, 410, 449;* Mexico, *C. L. Smith;* Cuba, *Wright 315, Wilson.*

2. **Favolus variegatus** (Berk.)

Hexagona variegata Berk. Ann. Mag. Nat. Hist. II. **9**: 196. 1852. Proc. Amer. Acad. Arts & Sci. **4**: 122. 1858.

This species was first described from plants collected in San Domingo, as follows:

"Pileo tenui coriaceo dimidiato rugoso crebri-zonato multicolori velutino; hymenio umbrino poris mediis."

It is a very showy plant and rarely escapes the collector, being large and much expanded, with surface brilliantly marked with variegated zones of red and brown tints. The typical form occurs in southern Florida and the West Indies in fair quantity, while it ranges either in this form or in one with smaller pores, called var. *membranacea* at Kew, to various parts of Central America and into South America. The well-known tendency of species in this genus to vary in pore measurement prevents me from founding a species on the variety just mentioned. Possibly when more is known of the plants in the field, such a separation may be found desirable.

Specimens are at hand from Florida, *Calkins, Small & Nash, Small & Carter;* Costa Rica, *Endres;* Nicaragua, *Wright, C. L. Smith;* Mexico, *Egeling;* Colombia, *Baker;* Brazil, *Glaziou, Balanza;* Peru, *Pearce;* Bolivia, *Bang.*

SPECIES INQUIRENDAE

Hexagona papyracea Berk. Ann. Mag. Nat. Hist. **10**: Suppl. 379. 1843. Described from some unknown locality; possibly from

Brazil. The pileus is said to be nine inches broad, five inches long and as thin as paper, resembling most a species gathered by Schomburgk in Brazil communicated by Berkeley to Montagne under the name of *Hexagona variegata*, but considered by him only a non-setose state of his *Hexagona aculeata.*

A specimen in the herbarium of the Agricultural Department at Washington, collected by Wright in Nicaragua and labeled *Hexagona papyracea* Berk., differs from plants ordinarily called *Hexagona variegata* in its thinner, flexible pileus and smaller, stag-colored pores. There is such a specimen also in the herbarium of the New York Botanical Garden collected in the Peruvian Andes by Pearce and marked *Hexagona variegata* Berk. Both of these specimens, however, are only var. *membranacea* of *Hexagona variegata*, as type plants at Kew show.

Hexagona cingulata Lév. Ann. Sci. Nat. III. Bot. **2**: 200. 1844. Described from material collected in Hispaniola as follows:

"Pileo coriaceo reniformi membranaceo nudo zonato pallide cinereo nitente, alveolis mediis fuscis e rotundo hexagonis intus cinereis."

"Petite espèce réniforme, nue, zonée, de couleur pâle cendrée, et brillante, large de 2 à 4 centimètres; ses alvéoles sont parfaitement régulières, de moyenne grandeur, fauves, obtuses à la marge, et cendrées a l'intérieur."

From the above description this species can hardly be different from *Favolus tenuis* (Hook.).

Hexagona leprosa Fr. Nov. Symb. 101. 1851. Described as follows:

"Pileo suberoso crasso pulvinato laevigato leproso-pruinoso umbrino, alveolis profundis amplis acutis fusco-umbrinis, intus nudis."

"In Insula San Jan, Indiae occidentalis. Oersted."

Plants of this name at Kew are very distinct from other North American species, being much thicker and having much longer tubes, reminding one somewhat of a wasp's nest. Further study is necessary before their exact relations are known.

Hexagona unicolor Fr. Nov. Symb. 101. 1851. Described from "America calidiori" as follows:

"*H. unicolor*, dilute ferruginea, pileo coriaceo rigido subflexili applanato concentrice sulcato glabro, alveolis mediis vadosis angulatis."

The following notes are appended to the description:

"Pileus dimidiatus, sessilis, peltato-adnatus, reniformis, 2 unc. circiter transversim latus, passim plures imbricati, dilute ferrugineus, non priorum instar incrassatus, sed tenuis applanatus subflexilis, rigescens tamen, sulcis concentricis concoloribus exaratus (nec a basi radiato-rugosus), glaber. Margo acutus, passim incisus, concolor. Contextus floccosus, dilute ferrugineus. Pori medii, regulares, 4–6-goni, obtusiusculi, dilute cinnamomei.—Inter fungos Americanos inveni, sed locum specialem ignoro."

The type of the species I have not seen, but the description indicates that it is not far from *Favolus tenuis* (Hook.). This opinion is strengthened by comparing *Hexagona fasciata* Berk., which Fries says is very near his *Hexagona unicolor*.

Certain resupinate forms, such as *Hexagona carbonaria* B. & C. (Grevillea **1**: 68. 1872), *Hexagona pallens* Sacc. (Misc. Myc. **2**: 14. 1884) and *Hexagona vittata* Ell. & Macbride (Bull. Iowa Lab. Nat. Hist. **4**: 68. 1896), described from South Carolina, Mexico and Nicaragua respectively, hardly come within the scope of the present paper.

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